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ABSTRACT

The use of Ritalin in public schools as a means of treating hyperactive children is a much debated issue. Research done on the drug is spotty, and conclusions about the effects of its use are few. A review of current research, however, indicates no consistent beneficial results when Ritalin is used to treat hyperactive children. This may not be due to the ineffectiveness of the drug but rather to improper experimental control of factors such as age, I.Q., sex, differences of diagnosis, and the severity of illness. Another important issue in the use of Ritalin is the frequency and severity of its side effects which include loss of appetite, headaches, abdominal pain, weight loss, nail biting, irritability, twitching, and insomnia. Implications for the use of Ritalin are weighty and require further detailed studies by physicians. (JB)

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THE USE OF RITALIN FOR TREATMENT OF MINIMAL BRAIN DYSFUNCTION AND HYPERKINESIS IN CHILDREN

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THE USE OF RITALIN FOR TREATING MINIMAL BRAIN DYSFUNCTION AND HYPERKINESIS IN CHILDREN

Methylphenidate Hydrochloride (Ritalin) is one of the most frequently prescribed drugs for treating hyperkinesis, or "minimal brain damage," in children. Other drugs such as chlorpromazine hydrochloride (Thorazine) dextroamphetamine sulfate (Dexedrine) and diphenylhydantoin (Dilatin) have also been used but Ritalin has become one of the most conspicuous drugs for treating the hyperkinetic child.

Whether or not (and to what extent) drugs such as Ritalin should be used for learning disorders and hyperkinesis has been the subject of articles in both scholarly and popular journals. (Charles, 1971, Vinnedge, 1971, Witter, 1971, Ladd 1970, Schwartz, 1971, Schmitt, 1969). News stories about behavior modification drugs have been reported over the national networks. In some instances the use of such drugs has provoked considerable furor within a community. Huntley and Brinkley reported a story about doctors in Omaha, Nebraska, who were "giving hundreds of school children so-called behavior modification drugs to 'make them behave better in school'", (Ladd, 1970). In one town in Michigan, a mimeographed message titled "Who's Pushing Drugs at School" was distributed to parents by "Concerned Citizens, Parents and Taxpayers Association of St. Joseph County." The message said in part; "But let's take a look at Ritalin . . . Regardless of how self appointed 'socialist' guardians hiss and writhe . . . Hitler used mind control drugs . . . to help create the "Frantic Nazi Youth" and Hitler as you know was a "National Socialist Criminal".

The debate about the use of Ritalin has raised many questions: Does the research on Ritalin indicate that it is effective? If Ritalin is effective, when is its use called for? Does the use of Ritalin retard efforts to find non-medical approaches for dealing with learning disabilities? What side effects does it have? Can it lead to addiction? Are procedures for diagnosis adequate? Is the use of drugs such as Ritalin more promiscusous than it ought to be? Does the use of Ritalin and other comparable drugs further the "drug culture" i.e., the belief that pills solve all problems? Does medication deprive him to that extent of the chance to develop insight and shell in self control." (Ladd, 1970). This paper will review the literature on the use of Ritalin for "Minimal brain dysfunction" in children, in an attempt to describe the state of knowledge with regard to these questions.

The first published report of the use of a durg comparable to Ritalin for the treatment of children with learning disabilities problems was written by Bradley, (1937). Bradley reported "spectacular improvement in school performance in half of the children," but he cautioned against use which might produce symtomatic relief while obscuring causal factors. (Bradley, 1937). Bradley noted the paradox of the subduing effect of a stimulant drug. He speculated that benzedrine might stimulate cortical regions which have inhibitary functions. Thirteen years later, in 1950 Bradley published a report of follow-up long term studies which reported positive findings. (Bradley, 1950).

In the same year as Bradley's follow-up report (1950), Ritalin was patented by CIBA Pharmacutical House. Ritalin is a substance which is chemically related to the amphetemines which are classified as stimulants. Ritalin is administered in oral (tablets) or parenteral (injection) form. In addition to its use for behavior disorders in children, Ritalin in tablet form is indicated for the treatment of drug-induced lethergy, mild depression, and apathetic or withdrawn senile behavior. Ritalin in injected form is indicated for the treatment of sedative overdose emergencies, hastening recovery from anethesia, and for increasing response to psychotherapy. Physician's Desk Reference, 1970).

Explanations of the effect of Ritalin on the nervous system are still tentative. Silver (1971) has developed a description of the action of Ritalin which explains the drugs effection of the central nervous system. The ascending reticular activating system (ARAS) and the limbic system have been identified as the two systems which play the basic role in arousal in the nervous system. These two systems work together in inhibitory interaction to maintain a state of "dynamic equilibrium" (Silver, 1971). According to available theory, dysfunction in the ARAS should produce:

(1) a decreased inhibition of sensory input, this bombarding the neocortex with sensory stimuli;
(2) a decrease in selective arousal of the neocortex resulting in less discriminating reception of sensory input;
(3) a decrease in facilitation of neocortical motor output, resulting in increase in apparent purposeless motor activity. (Silver, 1971, p. 128).

In other words, a dysfunction of the ARAS would result in what is called the hyperkinetic syndrome. Silver suggests that imbalance in the two systems is corrected by the action of Ritalin which serves to immitate the action of norepinephrine, an important biochemical which affects the function of the ARAS.

Until 1970, Ritalin was promoted by CIBA for use with children who exhibit "functional behavior problems." In 1970 the FDA ordered relabeling of Ritalin "as an aid to general management in the treatment of minimal brain dysfunction, which often manifests itself in the form of hyperkinetic behavior." (National Academy of Sciences-National Research Council Drug Efficacy Study). The change in the description was the result of a National Academy of Scienes- National Research Council evaluation authorized by the Food and Drug Administration. The NAS-NRC evaluation expressed concern about the imprecison of the existing labeling and recommended the change which was adopted in 1971. The NAS-NRC panel commented that "the 'functional' as opposed to the 'organic' nature of the hyperkinetic syndrome is highly controversial." (National Academy of Sciences-National Research Council Drug Efficacy Study, 1970).

A considerable volume of literature had developed in an attempt to define and describe the hyperkinetic syndrome. (Keogh, 1971, Wunderlich, 1969-70, Laufer, and Denhoff, 1957 for useful reviews and discussions). In general the major symptoms of the hyperkinetic syndrome are "an increase of purposeless physical activity and a significantly impared span of focused attention which may generate

other conditions such as distubed mood and behavior within the home, at play with peers, and in the schoolroom." (Office of Child Development and the Office of the Assistant Secretary for Health and Scientific Affairs, HEW, 1971, p. 2).

Hyperactivity seldom presents a problem for adults, although the syndrome can be observed in some adults. As Stewart points out, the hyperactive syndrome:

> is not confined to children. Many adults exhibit the same cluster of symptoms. In adult life, however, certain of the basic characteristics - high energy, aggressiveness, lack of inhibition - may be helpful in one's work, whereas in childhood, when one is required to sit still at a desk and concentrate on studies for long periods, the restlessness associated with the syndrome may be a great handicap and give rise to severe problems. (Stewart, 1970, p. 94).

Others in the literature agree with Stewart's contention that the problems which lead to the use of a Ritalin regime often (if not generally) occur in the school setting. (Laufer and Denhoff, 1957, Keogh, 1971, Millichap, 1968, and Worrell, 1971). The close relationship between the school environment and the use of Ritalin is indicated by the suggestion to physicians to discontinue the use of the drug during summer vacation. (Office of Child Development and the Office of the Assistant Secretary for Health and Scientific Affairs, HEW, 1971). The use of Ritalin, therefore, constitutes a medical response to what would traditionally be considered an educational or behavioral problem. The teacher (or other school medical or psychological specialist) may function

as a referal agent or may furnish information to the parent or physician about the child's behavior after he is placed on a Ritalin regime. Attitudes and beliefs of school personnel may be salient factors in treatment programs using Ritalin. The Report of the Conference on the Use of Stimulant Drugs in the Treatment of Behaviorally Disturbed Young School Children (1971) expressed concern about the child being stigmatized as "stupid," an "emotional cripple," or a "drug-taker." (Office of Child Development and the Office of the Assistant Secretary for Health and Scientific Affairs, HEW, 1971). This report also presented broad guidelines for the manner in which physicians, school personnel and parents should cooperate in treatment programs. Little research has been conducted to describe and understand the attitudes, beliefs, and roles of parents, physicians, and school personnel concerning the use of drugs such as Ritalin for treating behavior disorders.

A national poll of superintendents (N-700; response 40% of sample) indicates little approval (6%) for the use of behavioral modification drugs. Forty-eight percent indicated disapproval, and the remaining 46% were uncertain. (Nations Schools, 1971). If the findings of this study are valid (given the low return and lack of information about the survey design, the validity is questionable), administrators are not generally favorable toward the use of such drugs.

In a study by Robin and Bosco (1972) a twenty percent sample (150) of teachers in the Grand Rapids Public School were studied. The study was conducted to answer three questions; (1) What attitude do

teachers express toward the use of Ritalin; (2) What information do teachers have about Ritalin; and (3) What do teachers perceive as their role as it relates to the drug?

Teachers in this sample were generally favorable to the use of the drug. There was little strong opposition, such as was demonstrated by administrators, to the drug. Although almost all teachers (97%) claimed to know what Ritalin was, and two-thirds had one or more children in their class on a Ritalin regime, teachers had little detailed or accurate information about the drug. There was no consensus among teachers about how they should function in treatment programs involving Ritalin. Since two-thirds of the regular classroom teachers had come in contact with at least one child on Ritalin, it is clear that the need to deal with Ritalin is not simply a problem for special education teachers or school specialists.

Central to the debate about the desirability of the use of Ritalin is the literature on the effectiveness of the drug. Table 1 presents a summary of important aspects of evaluations of the effectiveness of Ritalin. Studies have been reported using subjects of average or better IQ as well as subjects of below normal intelligence. A variety of tests have been used, although some tests such as the Peterson-Quay, Bender-Gestalt, have been used in more than one investigation. Since hyperkinesis is generally found more frequently in boys than girls, the bias in favor of using boys in the investigations listed in Table 1 is not surprising. All of the investigators were for a relatively short time period. Eight months was the longest duration.

TABLE ONE

CHARACTERISTICS OF STUDIES OF THE EFFECTIVENESS OF RITALIN

Investigations	N and Sex	IQ	Symptoms	Duration of Study	Tests Used	Significant Results Attributed to Ritalin
Zimmerman and Burgemeister (1958)	108	mean 72.6	hyperactivity, inertia, aggressiveness, passivity, depression	6 mo.	1. Stanford-Binet IQ or Wechsler-Bellwew Intelligence Test for Adults	no
					2. Merrill-Palmer or Pintner-Patterson	yes
					3. Rorschach	?
Knobel (1962	150 110 Males 40 Females	90 or above	hyperkinesis	8 mo.	1. Parents' and Teachers' Reports	yes
					2. Clinical Observation	yes
Conners and Eisenberg (1963)	81 53 Males 28 Females	65 to 135	deprived, emotionally disturbed	10 days	1. Symptom Rating	yes
Conners, Eisenberg Sharpe (1964)	81 53 Males 28 Females	86.7 mean	deprived, emotionally disturbed	10 days	1. Paired-Associates	no
					2. Porteus Maze	yes
					3. Tremorgraph	?
Millichap et.al. (1968)	30 26 Males 4 Females	normal	minimal brain dysfunction	3 weeks	1. Peterson-Quay Scale (Personality Test)	no
					2. Draw-A-Man	yes
					3. Detroit Subtest for Auditory Perception	no
					4. Bender Visual-Motor Gestalt Test	no
					5. Frostig	mixed
					6. Motor Coordination	no
					7. Motor Activity (Actometer)	no

TABLE ONE (con't.)

Investigation	N and Sex	IQ	Symptoms	Duration of Study	Tests Used	Significant Results Attributed to Ritalin
Nichamin, Baranal (1968)	more than 100	?	hyperkinetic	?	1. WISC	?
					2. Bender-Gestalt	?
					3. Frostig	?
					4. "Various Academic Achievement Tests"	?
					5. Various Personality Tests (Rorschach, TAT) in some instances	?
					6. Laterality, Stereogenosis Visual and Auditory Perception	?
Knights & Hinton (1969)	40 5 Males 35 Females	above 80	hyperactive; reading spelling, and arithmetic problem; slow progress; clumsy	6 weeks	Pediatric:	
					1. Height, weight, blood pressure	mixed
					2. Urine pH	no
					3. EEG	no
					Behavior Ratings:	
					1. Parents	
					a. Peterson-Quay Behaviors	no
					b. Werry-Weiss-Peters Activity Scale	yes
					2. Teachers	
					a. Peterson-Quay Behavior Scale	no
					Psychological Tests:	
					1. Wechsler Intelligence Scale for Children	mixed
					2. Maze Test of Steadiness During Movement	mixed
					3. Holes Test of Steadiness While Resting	mixed

TABLE ONE (con't.)

Investigation	N and Sex	IQ	Symptom	Duration of Study	Tests Used	Significant Results Attributed to Ritalin
					Psychological Tests (con't.):	
					4. Pegboard Test of Fine Motor Speed and Coordination	no
					5. Bender-Gestalt	no
Sprague, Barnes, Werry (1970)	12 12 Males	98.6	antisocial distractable hyperactive underachievers	1 day	1. Visual Recognition Task	yes
					2. Stabilimetric Cushion to Measure Activity	yes
					3. Classroom Observation	mixed
Blacklidge and Ekblad (1971)	31 19 Males	70 median	special education students	4 mo.	1. Burk's Behavior Rating Scale (Parents)	no
					2. Burk's Behavior Rating Scale (Teachers)	yes
					3. Arithmetic Section of Wide Range Achievement Test	no
					4. Gray's Oral Reading Paragraphs	no
					5. Porteus Mazes	no
Weiss, et.al. (1971)	51 44 Males 7 Females	mean 104.5	hyperactivity, distractability, aggressability and excitability	4 to 6 weeks	1. WISC	yes
					2. Bender Visual-Motor Gestalt	?
					3. Goodenough-Harin Draw A Man	?
					4. Lincoln-Oseretsky Motor Development Test	yes
					5. Primary Mental Abilities Test	?
					6. Illinois Test of Psycholinquist Abilities	no

TABLE ONE (con't.)

Investigation	N and Sex	IQ	Symptoms	Duration of Study	Tests Used	Significant Results Attributed to Ritalin
					7. Detroit Test of Learning Aptitude (Auditory Attention Span)	no
					8. Frostig Developmental Test of Visual Perception	no
					9. Wepman Test of Auditory Discrimination	?
					10. Benton Finger-Localization	?
					11. Benton Right-Left Discrimination	?
					12. Peterson-Quay Check List	yes
					13. Continuous Performance Test	yes
					14. Weiss-Peters Activity Scale	?
					15. Durrell-Oral Reading, Silent Memory, and Spelling Test	yes
Campbell, Douglas, and Morgenstern (1971)	22 20 Males 2 Females	mean 99.0	hyperactive	4 weeks	1. Reflection-Impulsivity	yes
					2. Field dependence-independence	no
					3. Automatization	no
					4. Constricted-Flexible	mixed

Nichamin and Barahal's study (1968) presents three case studies of children who were prescribed Ritalin for perceptual disorders in addition to a description of their study of more than 100 children using Ritalin. They provide no results of the tests which they administered (with the exception of the tests for the three cases reported.) They concluded that Ritalin can be an effective treatment for perceptual disorders.

Knobel's and Nichamin and Barahal's studies fall into what DiMascio (1971) calls "Phase 1: Early Drug Trials" (p. 487). DiMascio characterizes studies at this phase with terms such as "heuristic", and "browsing," and the "research design, statistical evaluation, and use of refined objective test measure are of secondary importance." (p. 487). Later phases in drug studies are expected to involve more careful design. It whould be noted that Nichamin and Barahal's study fits the category of "Early Drug Trials" descriptively but not temporally since it was reported after more careful studies were in literature.

In a study which used low IQ children as subjects (Blacklidge and Ekblad, 1971), a standardized rating form for children's behavior was completed by parents and teachers in addition to other standardized achievement and general aptitude tests. The study used a double-blind procedure with a cross-over design. Subjects, however, did detect a difference in the placebo and Ritalin because of the taste of the pill. Each child acted as his own control. All three teachers in the study reported an improvement in behavior associated with Ritalin. None of the other measures (parents' ratings, Arithmetic Section of

the Wide Range Achievement Test, Gray's Oral Reading Paragraphs or the Porteuz Maze) showed any difference. Blacklidge and Ekblad explain the discrepancy between parents' and teachers' rating as a function of the "wearing-off" of the drug as the day progresses. They offer three tentative explanations for the failure of the drug to produce results in achievement: that the achievement testing was not sufficiently related to the instructional program, that children in special education classes are more anxious in testing situations since they are tested less frequently than children in regular classes, and that the dosage may not have been large enough. They do not entertain one other logical conclusion: that Ritalin is not effective in promoting academic achievement. Blacklidge and Ekblad tell us that their most surprising finding was the ease in obtaining parental permission to medicate and study their children. Societal pressures against "drugging the child" may not be strong in a parent who feels his child may be helped by a medical treatment.

Blacklidge and Ekblad"s findings on the Porteus Maze conflict with findings by Conners, Eisenberg and Sharpe (1964). In Conners, Eisenberg, and Sharpe, a "mild beneficial effect on maze performance in emotionally disturbed children was found." (Conners, Eisenberg, and Sharpe, 1964). They, however, used subjects in a different IQ group. In their study subjects were institutionalized children with IQ's ranging from 65 to 123, whereas Blacklidge and Ekblad's subjects were all mentally retarded in a residential care facility. In the Conners et al study, comparisons of Porteus Maze performance

according to IQ level, however, revealed that the significance was a function of differences at the lowest IQ level (Low IQ: $t = 2.13$, $p < .05$; Middle IQ $t = 1.70$, $p < .10$; High IQ not given but according to figure not significant). Conners, Eisenberg, and Sharpe began with 20 mg. per day and increased the dosage to 60 mg. per day. Blacklidge and Ekblad administered two doses of 10 mg. each per day. These differences make it impossible to identify the reason for the different finding on the Porteus Maze test. No support was found for an improvement in paired-associate learning. Measures of anxiety and impulsivity were taken in order to see if differences on such tests might be a factor in the response to the drug. No relationship was found.

In an additional paper which resulted from the same study Conners and Eisenberg (1963), the caretakers for the children filled out a symptom rating sheet for each child which included such symptoms as demanding, disobedient, listless and apthetic, anxious, and fearful. The group on Ritalin showed more improvement than did the placebo group, but the investigation noted large individual differences in responsiveness to the drug. Although the tremorgraph, a device used to record bodily movement, is mentioned in both studies, findings are not reported in either study.

In an uncrossed, double-blind study involving a large number of dependent variables (Weiss, Minde, Douglas, Werry, and Sykes, 1971), Ritalin was found to result in improvements over placebo in individual target symptoms (continuous performance test - a measure of distractability,

a l symptoms of psychopathogy on the Peterson-Quay check list), cognition and motor functions (WISC, full scale and verbal IQ, visual motor sequencing, Lincoln-Oseretsky motor development scale, Durrell-Oral reading, silent memory, and spelling subtests). Weiss' et. al. research involved destroamphetamine and chlorpromazine as well as methylphenidate (Ritalin). They report Ritalin to be the most effective of the three drugs. They point out that there are differences in the drugs with regard to their effect on various symptoms. and none of the drugs was inevitably effective. Once again in this study, significant differences between drug and placebo on parents rating was observed. Since the psychiatrist was found to be 100% in guessing which children were in the active group and 80%-90% correct (there were three placebo groups, one for each of the drugs studied), Weiss et. al. raise doubts about the utility of the practice of double-blind procedures. Unfortunately data on many of the tests included in the study were not reported, but they promise a future report.

Sprague, Barnes, and Werry (1970) found that Ritalin resulted in a significantly faster reaction time than either placebo or Thioridazine. The Sprague et. al. study is the only investigation uncovered which reports classroom observations of children using Ritalin. In the study a rating scale was developed and used by trained observers. Three classes of behaviors were rated: (1) seven types of common deviant behavior, (2) attention to school work, and (3) teacher-pupil contact. Also, an evaluation of the child was provided by the teacher. Of the 12 items on the rating scale, 6 were NS, 4 were significant at the .05 level, and 2 were significant at the .01 level. Significant differences were obtained on the visual recognition test and on the

amount of wiggling during the experimental session.

Millichap et. al. (1968) reports results which show no consistent benefit from Ritalin across several tests. Only on the Draw-A-Man test and on the figure-ground perception sub-test of the Frostig was a "significant and specific effect attributable to the drug demonstrated . . ." (Millichap, Aymat, Sturgis, Larsen, and Egan, 1968). In several of the other tests improvement was noted but the improvement associated with the placebo.

In Zimmerman and Burgemeister's study, (1958), subjects ranged in age from 4 to 33 years. No placebo was administered, and no statistical treatments were applied to the data. Clinical impressions are presented which support the use of the drug; however, the clinical impressions were those of the experimentors, in a situation when no blind procedures were involved.

Campbell, Douglas, and Morgenstern's study (1971) explored the cognitive style of hyperactive children and the effect of Ritalin. In a sense this study constitutes an examination of the intervening variables which are generally tacitly assumed when Ritalin's effect on achievement and aptitude variables is examined. Hyperactive children exhibited a cognitive style which was more impulsive than normal children, were able to isolate fewer embedded figures, were less able to control attention, and slower on measures of automatization (the ability to respond rapidly to simple tasks) than noraml children. The use of Ritalin was associated with less impulsivity and an improved ability to inhibit incorrect responses.

Knights and Hinton (1969), observed a generally mixed set of results on a variety of tests. They conclude that analysis of the results indicate that Ritalin had an effect on the ability to pay attention rather than motor speed or motor control. Knights and Hinton found no relationship between the symptoms and history of the subjects and the response to the drug. Also, no relationship between drug effectiveness and diagnosis of brain damage (physical findings or histories of probable brain damage) or non brain damaged children.

A review of the research on the effectiveness of Ritlain does not show clear and consistent benefit resulting from the use of the drug. In those instances where the same dependent variable is used in more than one study, consistent beneficial results associated with Ritalin Usage is not evident. This does not necessarily mean that Ritalin is an ineffectual drug; rather, it may suggest that the simple designs may be inappropriate in seeking an understanding of under what conditions and to what effect the drug works. As Fish (1969) has very carefully shown, a very serious deficiency in many of the studies is a failure to select fairly comparable groups for treatment. Variability with regard to differences in diagnosis, age, sex, IQ, or severity of illness is infrequently dealt with. Hyperactivity can range from mild to severe, although frequently menas for age, IQ and the sex distribution of the sample are given, the analysis generally do not examine the differential effects of the drug given differences in these or other salient variables. Fish (1969), DiMascio, (1971) describes how variables such as differences

in age, sex, and IQ could affect outcomes of studies. Multi-variable analysis which would be most appropriate have been put to little use. Another variable which affects the outcome is dosage. Different procedures for determining dosage as well as varying dosages have been employed in the studies. Difference in dosage makes it most difficult to cumvilate otherwise composable studies.

The dependent variables selected are questionable and may stimulate type II error. If Ritalin does eliminate some behavior which hinders learning, it is questionable whther we should expect the child to make up what was lost in the past. No one believes that Ritalin provides information to the brain, thus to expect differences in achievement (such as the Blackridge and Ekblad study, 1971) may not be correct. Other problems such as insensative behavioral measures, lack of double blind procedures, inappropriate statistical design have been at times limited the utility of drug researches, (Sprague, Barnes, and Werry, 1970).

One important issue in the use of Ritalin is the prevalence and nature of side effects. Most investigators report occasional sidw effects such as loss of appetite, headaches, abdominal pain, and insomnia (Knobel, 1962), loss of weight and appetite (Weiss, Minde, Dougla., Werry, and Sykes, 1971), loss of appetite, increase in stomach aches and nail biting (Conners and Eisenberg, 1963), difficulty in speaking and twitching movements of the face (Millichap, Aymat, Sturgis, Larsen, and Egan, 1968), insomnia, loss of appetite, irritability, crying, abdominal pain and headaches as undesirable side effects of Ritalin. (Oettinger, 1971). There is one report of gross behavioral changes

resulting from the use of Ritalin. Lucas and Weiss (1971) describe patients who experienced three severe reactions. Two of the cases were hallucinosis and one was catatonic withdrawal. In one of the three cases, the reaction was a result of a self administered overdose by an adolescent due to interpersonal stress. One recurring concern about the use of Ritalin as well as other amphetamines is the potentiality of the child becoming addicted. Since Ritalin is a non habit forming drug the danger of the child becoming an addict is unwarrented. The problem of misuse is possible. Lucas and Weiss (1971) describe a child who took more medication than was prescribed, because she felt nervous and wanted to relax. Eisenberg (1971) states that an unpublished follow-up showed no increase in drug use as among young adults who were on a stimulant regime as children.

The literature contains considerable discussion of ethical and practical problems which surround the use of Ritalin. Eisenberg (1971, p. 371) asks "who is being treated?" in cases when Ritalin is used. Whereas the adult generally volunteers himself as a patient, the child generally is brought to the physician for treatment. The child may be brought for treatment because "his mother is anxious about behavior that on a normative scale would be considered average . . .(or because) his teacher is angered by normally assertive behavior that threatens her authority." (Eisenberg, 1971). Eisenberg's response to this problem is to emphasis the need for through diagnosis before the treatment program is begun. Others (Millichap, 1968, Oettinger, 1971) have stressed the need for careful diagnosis procedures involving

such aspects intelligence and achievement tests, visual and auditoryperception tests, motor coordination, laboratory tests such as an evaluation of liver function, kidney function, and integrity of blood-forming organs, tactile perception, electro-encepholgrams. The difficulties of diagnosis were revealed in a study of 100 children who were referred to the Central Evaluation Clinic for Children, University of Maryland Hospital because of hyperactivity. (Kenny, Clemmens, Hudson, Lentz, Cicci, and Nair, 1971). Each child received a comprehensive evaluation which include a complete medical and social history. A through physical examination, a neurological evaluation, and an individually administered physchological examination. Seventy-eight children had electro-encepholgrams. Each child was seen by an average of three members of the staff for an hour in order for the staff member to make a global judgment on the child's activity level. In 58% of the cases, the child was not judged to be hyperactive by any of the staff members who saw him. There was little correlation between the neurological examination and the electro-encephlogram. This study indicates that an appreciable number of children who are referred for treatment as hyperactive do not require treatment. It is also possible that for some children the symptoms may be observed to a greater or lesser degree as the child changes situations. (Oettinger, 1971). Another problem is the problem of the risk benefit ratio in using a drug. Morbidity and mortality due to the drug is an obvious risk. As mentioned above, the effect of labeling

the child who is using a drug may aggravate the problem. (Eisenberg, 1971).

A somewhat more subtle problem is that the ability to treat may decrease the zeal to prevent. Eisenberg (1971) speculated that the availability of methods to cure lead poisoning may have been a factor in the "failure of the medical profession to take the leadership it should have exerted in public campaigns to remove lead-containing interior paints." (Eisenberg, 1971, p.374). Using the lead poisoning situation as an example, he continued:

> In like fashion, it is at least arguable that the relative ease with which symptoms of over-active and impulsive behavior can be treated with stimulant drugs might lead to a diminition of efforts to prevent those conditions which, inpart, bring it about; complication of pregnancy and parturition: post-natal infection, malnutrition and trauma; crowded homes and crowded schools; poorly trained and poorly motivated teachers; in addition to the unknown factors that require to be searched out. (Eisenberg, 1971, p.375).

Drug treatment is only one of a variety of possible treatments for the hyperkinetic syndrome or behavior disorders. The literature contains information about other possible approaches as well as the implications of hyperactivity for teachers. (Eisenberg, 1971, Worrell, 1971, Chess, 1971, Keogh, 1971).

Unfortunately there is a dearth of research in several important issues connected with Ritalin usage. The gaps in the literature was noted by the Conference on the Use of Stimulant Drugs in Treatment of Behaviorally Disturbed Young School Children which was sponsored by the Office of Child Development and the Office of the Assistant Secretary for Health and Scientific

Affairs, Department of Health, Education, and Welfare. They noted a "lack of information in many crucial areas." They expressed the need for careful longitudinal and follow up studies, studies of causes of behavioral disturbance, as well as studies of different socio-economic and ethnic groups to better understand characteristics of pathelogical behavior. (Office of Child Development and the Office of the Assistant Secretary for Health, Education and Welfare, 1971). Few studies of the social forces which may operate in situations where Ritalin is being used are available. There are ample statements in the literature about the procedures which should be used in diagnosing learning disabilities. Yet no studies of actual procedures are used by physicians are reported.

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